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HOMŒOPATHIC THERAPEUTICS IN GUN-  
SHOT-WOUNDS, AND THE SEQUELÆ OF  
OPERATIONS.

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This variety of traumatic lesions includes all injuries inflicted by missiles projected by the explosive force of gunpowder. Though comparatively rare in civil practice, yet in this country, where the sports of the field are so common, they occur with sufficient frequency to render a knowledge of them and of their effects indispensable to the accomplished surgeon. Occurring in all portions of the body, and in various degrees of severity, they present a wide and interesting field of study and investigation.

*History.*—From the earliest period of the employment of gunpowder in war alone, down to the present time, when it is also extensively and variously used for engineering purposes; the wounds inflicted by its means have excited the liveliest interest in the chirurgic mind, often appealed to by terrible injuries produced by the bursting of shells or the blasting of rocks.

That military surgery does not materially differ from the surgery of civil life is true only with some reservation.

As a science, surgery is the same whether practised in the wide operating tent of the army-surgeon's quarters, or in the cozy amphitheatre of the city hospital. As an art, however, it varies according to the peculiar nature of the injuries to be treated and with the attending circumstances. If we compare

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the almost superstitious dread with which the older surgeons regarded the effects of gunshot-wounds, and the erroneous views they entertained of inducing healthy action, with the accumulated experience and scientific treatment of to-day, we see at once the great advance that has been made in this department of operative surgery. Formerly the wound was considered a poisoned one, which could only be cured by a long and tedious process of suppuration that would prevent the absorption of the poison into the patient's system. The irritative fever, the emaciation and other results of the protracted cure of the injury, were thought to be so many evidences of the indirect effects of the poison permeating the physical structure; just as the shock or injury, the loss of vitality along the surface track of a small projectile, or of the tissues denuded by the passage of a cannon-ball, were considered evidences of its indirect effects. In obedience to this method of reasoning, the openings of entrance and exit of the ball were incised; the wound dilated by tents or other substances; terebinthines, or even boiling oil poured into it; and irritating compounds and ointments applied, where superficial dressings were practicable; and it was only after the wound was considered to be fully purged of its venom and foul humors, by the extensive suppurative action thus kept up, that cicatrization was permitted to be established.

It required many years of observation, many and severe human conflicts, untold misery and death of thousands of the race, besides the exercise of much labor and moral courage, to stem the tide of professional custom and prejudice, and inaugurate a simpler, better and more efficacious method of treatment. Not until the great and last achievement of the celebrated John Hunter, who wrote on the subject of the "Blood, Inflammation and Gunshot-wounds," in 1794, was the profession thoroughly awakened from the ignorance and prejudice which up to that time had prevailed in all departments of surgical science and art. Having served as a surgeon on the staff of the army in the expedition against Belleisle, in 1760, and subsequently in the same capacity in the campaign in Portugal, in 1763, Hunter had acquired a reputation that elevated



him to the highest positions in the medical department of the British service. In 1776 he was appointed Surgeon Extraordinary to the army, in 1786 Deputy Surgeon-general, and in 1791 Surgeon-general; the highest medical position then known in England.

It was John Hunter, also, who advocated with great force the delay of amputation, after severe gunshot-wounds, that "the patient's constitution might accommodate itself to the injury;" a proceeding which more extended observation and experience have demonstrated to be more dangerous than the primary or immediate operation.

Mr. Guthrie writes, in his "Commentaries on the Surgery of the Peninsular War, between 1808 and 1815," that the principles and practice of surgery, which prevailed at the beginning of the war were almost entirely superseded at its conclusion; and further adds that the art of surgery received greater impulse and improvement from the practical experience of that war than ever before.

The still more recent military operations in Algeria, in Schleswig, in Holstein, in the Crimea and India, have furnished abundant opportunity of testing practically many great improvements that have been made in surgery by its distinguished practitioners, both in civil and military life. Prominent among these may be cited the excision of joints, in lieu of amputation of limbs, that was so largely practised by the older surgeons; resections of injured portions in the continuity of bones; amputations limited to the removal of terminal portions of the extremities destroyed by the original injury; and other methods of what has been styled conservative surgery.

The war of the Rebellion in our own country has perhaps added as largely to our experience in the treatment of gunshot-wounds, especially from rifled arms, as any of the wars previously referred to. The Government of the United States, following the example of England, is still engaged in collecting and arranging the observations and experience of its medical officers during the war of the Rebellion, and has published a valuable and instructive series of reports, covering a large

percentage of the injuries of the war and their results. Illustrations of morbid specimens and carefully-drawn cuts of surgical diseases prepared during and after the war, have been collected and arranged for the Surgical Museum at Washington.

The great variety and severity of injuries from gunshot-wounds demand of the surgeon not only a knowledge of their treatment, but of the principles that govern projectiles; the form, weight and velocity of missiles, and their course and effects upon the body, as well as an intimate acquaintance with physiology and anatomy, in reference to the position of wounds and their consequent effects upon the system. This leads us to consider the qualities and kinds of projectiles in use at the present day, by which direct gunshot-wounds are produced, and which are included under the head of cannon, musket and rifle shot, shells, hand-grenades, case shot and other minor varieties. Besides these, are the agents by which indirect injuries are inflicted, such as stones or other hard substances driven from parapets or the surface of the ground by cannon-shot; splinters of wood from platforms and other frameworks; iron-spikes or fragments of other hard substances forcibly driven by contact with the flying ball or shot.

*Forms of Missiles.*—Among the various forms of projectiles known in the art of warfare, may be enumerated: 1. The spherical, which includes cannon-balls, grape, musket and pistol-shot, and shells; 2. The cylindro-conoidal, such as balls belonging to rifled cannon and muskets; 3. Irregular, but generally bounded by linear and jagged edges, as fragments of shell and splinters. In the largest kind of balls, such as are projected from cannon, siege or field pieces, the form is of little moment to the surgeon. The chief consideration in wounds from these missiles is the degree of force, or the momentum by which they are driven forward to produce their injurious results.

In the smaller variety, however, there is much that challenges attention. The effects of the cylindro-conoidal ball upon the osseous system, are very different from that of the common round ball. The former, with its wedge-like quality,



splits the bones into fragments, the direction of the fracture running parallel with the central cavity, the fissures often extending from the seat of the injury to the joints, in which the bones terminated. From the round ball such results rarely occur; the fragments produced by their impingement being more of a cuboid form.

The splintering produced upon the apophysis of a bone by the conoidal bullets extends to a considerable distance into the shaft, while that from the round ball is usually limited to the apophysis itself. A knowledge of these results is of value to the surgeon when the operation of resection is considered, and will often guide his judgement as regards the propriety of operating when other means of information are inaccessible. Another result of the wedge-like form of the conoidal bullet is, that in coursing through soft structures it divides and separates tissues, and is, therefore, less opposed in its passage through their parts than the round ball. It is partly due to the form, as well as the increased momentum, of the pointed bullets, that the lodgment of balls is infrequent now as compared with the experience of former wars.

*Weight of Missiles.*—The generally-received opinion among medical men, that the weight of projectiles exercises injurious influences upon the human structure wherever wounded, is not borne out by observation.

In the Franco-Russian war, the bullets used by the Russians were nearly one-third heavier than those used by their opponents, yet the effects of these larger masses against bony structure were merely wider in proportion to their greater size and momentum; while in flesh-wounds the increased size of the orifice left by the larger ball gave readier exit to the foreign substances, and to the surface discharges.

Mr. Guthrie, who has enjoyed a large field of observation of the effects of missiles upon the human organism, says, that the musket-balls of the English, sixteen to the pound, produced no more mischievous effects upon the French wounded than were produced upon the British by the French bullets of twenty to the pound. It seems, therefore, to be well authenticated, that the form, solidity and velocity of musket-balls is of greater importance to the surgeon than their weight.

*Course of Balls.*—The circuitous and erratic courses of balls through the body, as related by older authors, have rarely been met with in later wars, owing to the fact that the conoidal rifle ball, almost in general use, penetrates soft tissues in a straight line, and enters bony structure like a wedge. It might seem that the track of a cylindro-conoidal bullet cannot correspond with a straight line; but if the surgeon will carefully place the patient in the position he occupied at the reception of the injury, it will be found on examination that the deviations from the straight line are more apparent than real. Allowance should of course be made for the spasmodic action of the various muscles, and the momentary displacement of other structures on the occurrence of the injury. A case came under my observation at the U. S. Mound City Hospital (near Cairo, Illinois) during the late war of the Rebellion, where a soldier, at the siege of Fort Donnelson, received a ball at the back of the neck to the right of the ligamentum nuchæ, which traversed the whole length of the spine, and made its exit near the nates. During the inflammatory period, the course of the ball was distinctly visible by a well-defined red line marking its track. Dr. Cauniff mentions a case of a private in one of the New Jersey regiments, wounded in the right arm while in the act of putting a cartridge into his musket. The ball, after cutting off his forefinger, passed directly through the body of the hand, and again entering the back part of the arm, about two inches from the wrist, ploughed a furrow for a few inches, then penetrating the deeper part of the arm, it finally made its exit, a little above the external condyle of the humerus.

During my service in the army, I was a witness to many interesting instances of the strange and anomalous course of balls in the various portions of the body. In one case, the bullet made more than two thirds the circuit of the neck, and was cut out just beneath the skin. In another, a ball entered at the crest of the ileum, passed downwards parallel with the thigh, and emerged just above the knee-joint.

Illustrative of this point, a case is related wherein a desperate lover attempted suicide with a loaded pistol, the muzzle



having been placed in direct contact with the heart. The bullet in its flight struck the flat surface of a rib, deflected towards the spine, passed downward, and was removed at the buttocks.

Bullets sometimes remain in the body for a long time, frequently for life, without producing much inconvenience. Lying imbedded in the substance of a muscle or in the layers of its aponeurosis, it becomes incased within a fibrous sheath and the parts becoming accustomed to its presence, little or no inconvenience is felt by the system. But, when it lies in the course of a considerable nerve or large vessel, its pressure in the first instance may produce paralysis, and in the second occasion more or less disturbance in the circulation beyond that point. A most interesting case of this nature occurred in my practice about six years ago, in which a bullet was driven into the upper part of the thigh. All efforts for its removal proved unavailing. The wound healed, and the patient attended to his ordinary duties as if nothing had happened, when suddenly (four years after the injury) he was attacked with loss of motion in the leg. Having put himself under the care of one of our best surgeons and received no benefit, he presented himself to me for examination and treatment. Placing the body of the patient in the same position as when he received the injury, I examined carefully the upper part of the thigh, and discovered the bullet lying in contact with the crural nerve.

The ball was removed, the patient improved in strength and in a short time fully recovered the use of the limb, and up to this time enjoys uninterrupted health.

After the siege of Fort Donnelson, among the wounded sent to the Mount City Hospital, under my charge, was a private in one of the Illinois regiments, who had been struck by a six-pound rifle shot in the fleshy part of the hips. The wound appeared considerably lacerated and contused, but the fact of the missile being concealed within, had escaped the observation of the surgeon in attendance, owing to the large number of wounded requiring his aid and the want of sufficient time for extended and careful explorations. It was perhaps for a like reason that the ball was not discovered until the second day of his entrance into the hospital, when it was removed after considerable difficulty.

This specimen is still preserved in my private collection, and has created much surprise and discussion. The ball is cylindro-conoidal and is of cast iron, with a copper base, and evidently intended for rifled cannon.

*Velocity of Missiles.*—The velocity of motion of projectiles is an important consideration to the surgeon in its bearing on the wounds inflicted. The wounds received in modern warfare differ materially in character from those inflicted in olden times. In a table showing the force and velocity of certain moving bodies, the common musket ball is set down as moving at the rate of 850 miles per hour; the rifle ball 1,000; the 24 pound cannon shot at 1,600 miles per hour. The musket ball could not be depended on to hit an object beyond 80 yards, the ordinary rifle 250 yards; while the present Enfield rifle is sighted to hit an object at 900, and the short Enfield at 1,100 yards. The effects of these different rates of velocity are observed in the character of wounds inflicted; thus, a cannon ball, which, with but a slight velocity of motion added to its weight, would knock a man over; at rapid speed will carry away a limb without disturbing the general equilibrium of the body.

A musket ball, that would be arrested in its course half-way through a limb, is now replaced by a bullet which at the same distance will pass through several bodies in succession. This increased velocity produces its effects in two ways: first, by the greater destruction of tissues in the track of the projectile; second by the greater disturbance of the nervous system. The portions of the body traversed by a ball with this increased velocity are so shocked and contused, and the vital tissues so impaired, that healing by the first intention is exceedingly rare. Instances are given where gun-shot wounds have healed by the first intention, but these cases I think, are those wounds, that have been produced by the bullet becoming flattened or its edges jagged by coming in contact with some hard substance previous to the injury inflicted upon the body.

I have seen a few instances of this kind during my army experience, but these wounds are very different from the injuries inflicted by rifle balls under ordinary circumstances.



The splitting and destructive effect of conoidal balls on the shafts of the long bones of the extremities, were abundantly witnessed, during the war of the late rebellion. The old round balls, partly from their form, partly from the imperfect mechanism of the gun itself, with the corresponding diminished velocity, on hitting bones, either deflected in their course or broke away a part of the shaft without further injury; or, having broken through the shell of the bone, would be found imbedded in its cancellated structure, or be "planed" without penetrating its substance.

The modern conoidal ball is made denser by mechanical pressure and, with its wedge-shaped end, possesses greater power of penetrating the tissues than the old fashioned moulded ball. This is abundantly proved by the injuries inflicted by the Enfield, Whitworth and Minnie rifles during the late American war. Both the records of the surgeon general's office and private collections gathered during the great war of the Rebellion show that the Minnie ball is rarely deflected in its passage through the body; and even when the ball has been very much battered, it has been known to pass through the largest bones; and with a lesser degree of momentum to bury itself in the cancellated structure rather than be turned aside by the object. The conoidal bullet seems to penetrate with both an onward and a spiral motion, by which its destructive power is largely increased.

*Law of Missiles.*—First, the greater the velocity of the projectile, the greater is the danger to life; second, the swifter the bullet, the more direct is its course through the body; (hence, the greater danger of wounds of viscera and other important parts from balls received at close quarters); third, the slower the momentum of a ball, the more apt it will be to splinter the bone struck; forth, free and primary hemorrhage is more frequent from wounds made by swift, than slow balls; the latter being more frequently followed by secondary hemorrhage; fifth, a slow round ball, striking a bone without sufficient force to splinter it, is apt to be "planed" upon it; while a swift, round ball, striking against a sharp angle or crest of bone will often be split in two, each portion pursuing

a different course. A ball penetrating the soft structures always produces a contused wound; and from the resistance experienced at the point of entrance, the contusion is more marked than at the point of exit. In consequence of the contraction of the surrounding structures, the orifice of entrance is smaller, and more contused and depressed from without inward, while that of the point of exit is large, ragged, everted, and irregular in its appearance; looking more like a lacerated wound. Mr. Guthrie explains these differences as due, partly to the momentum of the ball and partly to the resistance afforded by the soft structures. If the bullet strike the object, immediately following its discharge and when at the maximum of its velocity, the opening made will be small, round and contused, the parts appearing to be separated rather than divided. If it pass through soft structure only, its degree of momentum being but little opposed, the point of exit will differ slightly from that of entrance. If, however, the ball is opposed in its passage by any hard substance, such as bone, ligament or cartilage, its velocity being lessened, the aperture of exit will be large, ragged and irregular. The point of entrance in all bullet wounds is actually smaller than that of the ball producing it, if made when the ball is flying with full velocity; becoming larger and more irregular in proportion to the diminished velocity of the missile.

The size of the missile inflicting the wound exercises considerable influence on the character as well as the appearance of wounds; the larger the missile the greater the destruction of the structures, and vice versa. Chained cannon-shot and double-bullets were introduced into warfare during the Franco-Russian campaign; but the injuries inflicted by them, if any, have not been made a subject of especial comment. Dr. M. Schrive, in his "History of the Eastern Campaign" notices the fact that incendiary bullets, consisting of a small cylinder of copper, containing a quantity of detonating powder and made up in the form of an ordinary cartridge, were used by the Russians against their foes. The object of the missile was to explode as soon it had entered the person, thereby inflicting a very serious and dangerous wound. "It was after the siege,"



Dr. Schriive remarks, "that these bullets were discovered, and certain wounds of a violent and frightful character accounted for."

Balls containing certain poisons, and others charged with detonating powder, are said to have been employed by the Southern army during the war of the Rebellion; but the most scrutinizing search on my part and on that of others connected with me, failed to discover any evidences of such missiles having been used. As the result of extensive lesions made by such missiles, death must take place immediately; or else the most violent and ungovernable gangrenous inflammation must ensue, imposing upon the surgeon amputation as the only alternative.

*Spent Balls.*—In connection with the preceding paragraphs it is proper to notice the effects upon the system of what are termed "spent balls," or projectiles of various weights moving with diminished velocity. After the momentum of a cannon-ball has been so diminished that it falls to the ground, it may, if uninterrupted, roll upon the surface of the earth at a speed a little greater than a man's ordinary walk. Striking an object at this time, it may produce a serious injury even to an extent demanding amputation, if the part struck should, perchance, be a foot or a leg. I was a witness of a severe injury of this character inflicted upon a private in one of the Missouri regiments. In a spirit of bravado, he attempted to stop one of these partly spent balls by interposing his foot against its onward movement; and lost his leg in consequence. Coming in contact with other portions of the body, a ball of this kind may inflict severe injuries to internal organs; the surface not showing any evidence of external injury sufficient to account for the damage done within. In the same manner, though without sufficient velocity to carry away a limb, it may produce extensive contusions of the external parts, and cause comminuted fractures of bones. Cannon-balls inflict injuries in two ways. First, they contuse a part without destroying the integrity of the skin; the ball strikes obliquely, or rolls over the surface of the body, completely pulpifying muscles and lacerating vessels and nerves; laying open large joints, and literally

mashing bones; and yet, owing to its elasticity, the skin is hardly bruised. By the older writers this was ascribed to what they termed "windage of balls," or the action of a current of air set in motion by the projectile. Second, cannon-balls coming in contact with a limb or portion of the body, carry away all the soft structures before it, tearing and lacerating them and inflicting the most frightful injuries. This so called "windage of balls" is purely mythical; as is proved by the fact, that during the different naval and military conflicts in the late Rebellion, I have known pieces of dress, parts of accoutrements, buttons, and even portions of the body to be taken away by balls, in rapid motion, without any serious injury being done to the structures beneath. A memorable instance of this kind was witnessed by the writer during the naval and land attack on Syayne's Bluff in 1863. Captain Groyn, commander of the U. S. gun-boat, Benton, while engaging the enemy's batteries, received a wound from a cannon-ball which struck the chest obliquely, and passing onward, carried away the skin and subjacent tissues; even exposing the ribs. This gallant and meritorious young officer lived several days after the injury, and died from the secondary and remote effects of the wounds.

Even hair from the head has been shaven off, and portions of the nose and ear have been carried away without any injury to the structures lying beneath or in close proximity,

*Lodgement of Balls.*—Diminished rate of velocity tends to the lodgement in the body of all kinds of projectiles. During the employment of the old fashioned round bullet, lodgement of balls was of frequent occurrence, owing to their small velocity, and their liability to be deflected from a direct course and to be checked by interposing obstacles. Conoidal bullets lodge only when their momentum has been nearly expended before entering the body; or, from the peculiarity in the posture of the individual wounded. A ball having had force enough to traverse a limb, may afterwards enter into another part of the body and lodge. A ball may penetrate so deep into the muscles, and lie so far from its point of entrance that the surgeon is, either unable to disclose its position, or, finding



it, is fearful that in extricating it he may inflict greater damage on important parts. In case of lodgement of balls the effects will be either grave or otherwise : depending, as I have before remarked, upon the site or position of the offending object. Sometimes the "lodged balls" give rise to inflammatory trouble, and the formation of abscesses, which will open from time to time, and again heal, until the offending material approaches so near the surface, that it may be extracted without much difficulty.

*Symptoms of Gunshot Wounds.*—Having discussed the qualities of missiles by which gunshot wounds are inflicted, I shall now consider the characteristic features and symptoms of the wounds themselves. The symptoms of this variety of wounds are of two kinds, *local* and *constitutional*. The local symptoms reflect the condition of lacerated and contused wounds. The leading characteristics are, much tearing and stretching of the tissues, and very often considerable laceration of the soft structures. When a cannon-ball strikes the body in a direct line, it carries away all that is before it. If the head, chest or abdomen be the part struck, an opening is made into it corresponding to the size of the ball ; the internal organs are broken and scattered in every direction, and life is extinguished at once. If it be a part of an extremity which is removed, the stump will be found pulped, contused, and minute particles of bone seen buried in the fleshy portions ; the end remaining attached to the body swinging uselessly. In a wound by *ricochet*, or when the velocity of the projectile is partially expended, the portion struck may likewise be carried away, but the laceration of the structures will be even greater than in the first instance. Muscles will be detached from each other, and their denuded portions appear flabby, with impaired vitality ; spiculae of bone will be found attached to the broken surface, and the shaft may be shattered and split far above the line of its transverse division. If the momentum be still further diminished so as to approach the condition of a spent ball, the part struck may still be carried away, but the external appearances will be limited to extensive contusion and laceration of the soft structures, or great tumefaction and ecchymosis

without rupture of the surface. When a cannon-ball strikes in a slanting direction, the external appearance of the parts will resemble that last described, modified of course by the degree of obliquity with which the part is struck. Fragments of shells and splinters of wood, when forcibly impinging upon the body, produce great separation and laceration of the living tissues, but do not grind and pulpify them as in the case of the round ball. Small missiles upon penetrating the body leave an opening similar to that of ordinary shot, varying, of course, according to the form and velocity of the projectile inflicting the wound.

*Pain.*—Pain consequent upon gunshot injuries is greater or less according to circumstances. In some cases it may be entirely absent, the person, although severely injured, being unconscious of the wound until some minutes after its infliction. It is characteristic of this class of wounds that the amount of pain is not commensurate with the degree of violence done to the parts; but rather dependent on constitutional peculiarities. I have frequently seen soldiers wounded in various parts of the body, entirely unconscious of their injury and fighting on as if nothing unusual had happened, until they were either overcome by the loss of blood, or had attention called to their condition by a comrade. Wrought to the highest pitch of excitement, amid the whirl of events and the continuous din of battle, I have seen some pushing forward, thoughtless of danger and fearless of death, oblivious to injury, and unconscious of their wounded condition; while others would falter and fall without a scratch, and imagine themselves severely and even mortally wounded. A remarkable instance of this latter kind, showing the impressionable character of some persons, and the powerful effect of the imagination, occurred during the charge of the Government troops upon the rebel batteries at Chickasaw Bayou, in December, 1862; when a young and gallant staff-officer was carried from the field in consequence of an alleged injury to his leg. Arriving at the Brigade Field Hospital, under my charge, he was laid upon a mattress, and an attendant was ordered to strip off his clothing, boots, etc., that the injury might be exposed. Immediate and careful



search was made for the wound, but not the slightest abrasion appeared on any part of the body. Mortified beyond description at his self-delusion, the young man hastily rose to his feet, and mounting his horse rode away to the front. When pain attends a gunshot-wound, it is of a dead and aching kind; and differs essentially from the pain which accompanies either incised or punctured injuries; it is only severe when a considerable nerve is divided, and then it assumes a sharp, pricking character followed by numbness and perhaps paralysis of that part of the body supplied by the nerve.

Thus, division of the sciatic nerve in gunshot-wounds of the thigh, produces loss of both motion and sensation of the distal parts, attended with coldness of the limb. But the pain, which may have been slight at the reception of the injury, becomes intensely aggravated after the inflammatory symptoms have set in.

*Hæmorrhage.*—As a rule, hæmorrhage is not excessive in gunshot-wounds, nor at all in proportion to the severity of the injury. The tissues immediately connected with the track of the ball, are usually so much confused and their vital force so much shocked as to prevent the flow of blood from the smaller vessels. If a vessel of considerable size is partially divided the hæmorrhage will be extensive; but, if the vessel is cut entirely across, the flow of blood is very much diminished, in consequence of the vessel retracting within its sheath. In the former case the blood flows freely, and though it may be temporarily arrested by the clot, which forms during syncope; as soon as reaction takes place the clot will be washed away, the hæmorrhage again returns and so continues until prevented by mechanical means, or life is extinct from loss of blood. In the case of a vessel being entirely cut through, little or no hæmorrhage occurs at the time of the injury, but subsequently takes place when reaction sets in or the clot is washed away by other causes. But, while primary hæmorrhage is rare in this variety of wounds, secondary hæmorrhage is exceedingly common. The lacerated and confused condition of the injured structures is prolific of inflammation and its consequences, which, under the ulcerative process, sequesters the injured

structures, opening the vessels lying in its track, and hemorrhage of greater or less magnitude is the result. A period of greatest danger in these wounds is when the sloughs begin to separate, which continues from the twelfth to the twentieth day. Previous to this time it is often impossible to ascertain the precise extent of the disorganization. Afterward the patient, if his limb be saved, may have to undergo the long and tedious process of exfoliation of dead bone, thereby incurring the risk of intercurrent attacks of erysipelas, hospital gangrene and visceral complications.

*Symptoms.*—When an important viscus is wounded, a limb suddenly shattered, or a cavity penetrated by a flying missile, the symptoms by which the system is affected by the injury are called “shock.” The sufferer trembles, is pale and faint, and perhaps vomits. The features are shrunken, expressive of intense anxiety and distress. At times this “shock” is slight, even under serious injury; while in other cases it is disproportionate to the amount of injury; stout and vigorous persons often swooning away from the most insignificant wound.

Whatever is the cause of this difference in the *morale* of different persons, it is certainly true that many live in spite of the most severe injuries; while others die from comparatively slight and unimportant wounds. Temperament and idiosyncrasy exercise, no doubt, great weight in the production of these phenomena, and should modify largely the prognosis in the case.

It is said that veteran soldiers upon the field of battle (other things being equal) suffer much less nervous trepidation on account of their injuries than raw and inexperienced troops.

This does not correspond with observations made during my connection with the army during the Rebellion. For example, in the attack upon the rebel batteries at Chickasaw Bayou, General F. B. Blair's brigade, of which I was senior medical officer, composed almost entirely of raw levies, was ordered to lead the charge. The slaughter was immense, and, as a rule, the wounded, inexperienced, volunteers did fully as well under their wounds, and convalesced as well as the oldest veterans or regulars in the service. Other constitutional symptoms



will supervene during treatment due to other causes, such as loss of blood, exhausting discharges, local irritation, insomnia, imperfect diet, etc., etc.

*Prognosis.*—The prognosis of gun-shot wounds should be made with extreme caution and judgment; more especially when the shock is severe, or there is reason to fear that deep-seated parts are involved, inducing serious constitutional complications. The character of the wound, the form of the missile producing it, the constitutional status, previous service and past diseases of the patient; his temperament, idiosyncrasy, age and time elapsed since the injury, should be considered and carefully weighed before pronouncing final judgment upon the termination of the case. The mortality succeeding gun-shot wounds depends less upon the direct effects of the injury received, than upon the subsequent complications; such as secondary hemorrhage, gangrene, erysipelas, hectic fever, tetanus, pyæmia, and the results of operations required as consequences of the original wound.

*Mechanical Treatment.*—It is impossible, in the limited space allowed for a monograph of this character, to do more than to sketch those general principles of treatment, that attach to gunshot-wounds, and the consequences that ensue from such injuries. The first thing to be accomplished after injury of this kind, is relief of "shock" by the use of those agents which tend to support the vital powers in their endeavor to overcome the deleterious impression made upon them. This is called reaction and is induced by placing the patient in a horizontal position, dashing cold water on the face, applying Ammonia, or other stimulating agents to the nose, briskly rubbing the limbs and chest with rubefacients, stimulating injections thrown up the rectum and internal use of those remedies that support the impaired nerve power. If internal hæmorrhage occur, those means should rather be employed that favor the formation of a clot, than those which excite the arterial system to increased action; as the increased flow of blood through the vessel washes away the clot and induces internal hæmorrhage. In such a case the patient should be placed upon his back, stimulants interdicted and either of the following remedies given according to its

pathogenesis : Acon., China, Erigeron, Hamamelis, Secale cor., Ipecacuanha. The treatment of soldiers in the field, whenever circumstances admit, should consist of the use of such necessary surgical appliances and temporary dressings as may be required before they are removed to the Regimental or General Field Hospitals in the rear. A little attention to provisional dressings, and a few judicious directions to the attendants, while transporting them to the rear may avert serious complications in various ways. In the open field and near the scene of conflict, but far enough removed from danger both to the surgeon and patient, are what are called the "first lines of surgical assistance," where assistant surgeons are placed, to be ready at all times to render such assistance to the wounded as their injuries require.

In the British service and during siege operations, shot-proof coverings, constructed in the trenches, are placed at fixed points, where the wounded are received for the first examination and dressings, before they are conveyed to the hospitals in the rear. The French troops, in lieu of this service, employ flying field-hospitals (*ambulances volantes*) stationed at selected spots near the scene of the conflict to perform the like duties. When the wounded arrive at the field-hospital, the surgeons in attendance should be prepared to take immediate charge ; to examine carefully each wound, to remove all foreign bodies which may have lodged there ; to adjust the edges of the wound accurately and neatly and to apply the necessary dressings.

The diagnosis should be made out as clearly as possible, after the arrival of the patient at the field-hospital ; all the attention required for his comfort and safety should be given at this time ; the injuries should be carefully examined ; the garments scrutinized to ascertain if any portion has been driven into the wound ; and the required dressings be prepared for service.

In all gunshot-wounds the best and most reliable instrument for a thorough and complete examination is the finger of the surgeon. Exploration by this means establishes the direction of the wound ; and, if a bone be fractured, the extent, shape, position, number and degree of looseness of the fragments can

be more easily ascertained than by any other known process. If foreign bodies occupy the internal part of a wound, the finger will detect their quality, size and depth within. If the wound is so deep that it cannot be reached by the finger, pressing the soft parts with the other hand towards the exploring finger will often facilitate the examination.

If the finger should fail, the best substitute is a long silver probe, that can be readily bent if required, the better to adapt it to the irregularities of the wound; or, the bullet detector of Dr. Wilder. Elastic bougies and catheters have been employed by a few surgeons, but in my opinion they are inferior to the probe. As soon as the lodgement of a ball or missile has been ascertained it should be removed; and either of the following instruments may be employed for the purpose: Coxeter's extractor, Kolbe's bullet extractor, or the bullet forceps (of which there are a variety of styles and patterns.)

In certain cases I have employed the ordinary dressing forceps for extracting bullets, when all other instruments failed. In all deep seated wounds, caution must be employed for fear of injuring vessels or nerves which have escaped injury from the penetrating missile.

In removing slugs, fragments of shell, planed balls and such like objects, it is necessary to enlarge the wound for the ready exit of the offending materials. When it happens that a foreign body has penetrated only a small distance from the surface, and is felt lying under the integument, an incision may be made over the object to secure its removal, firmly holding it in situ before making the opening. If balls are impacted in bone, as may happen in the extremities of the long bones or in the bones of the pelvis, it is just as important that they be removed as those occupying the soft structures; although it is a well ascertained fact, that bullets have lodged in bones without producing any more serious inconvenience than abscesses and fistulous tracks. If the lodgement is superficial it can be extracted by means of a steel elevator; but, if the impaction be deep-seated, the "tire-fond screw" or "lever" sharp pointed bullet forceps, may be called into requisition. It should be impressed upon the mind of the surgeon, that rude



manipulations and long continued attempts at extraction are not only unnecessary but absolutely injurious. Whenever gunshot-wounds have been subjected to much rude handling, laceration and disturbance of the tissues in extracting the foreign bodies lodged within, it should be the surgeon's duty to readjust and secure the broken surfaces as promptly and neatly as possible, by the application of strips of adhesive plaster, light pledgets of lint, moistened with the remedy to be locally applied, the adaptation of a roller, and the favorable position of the limb or part of the body wounded. Since pressure, weight and warmth are injurious to the process of granulation and cicatrization, the coverings should be light and the wounds frequently dressed with lint or charpie saturated with the indicated remedy. Velpeau and other French surgeons strongly advocated the use of linseed-meal poultices in lieu of water dressings. Baudens and Stromeyer extolled the topical application of ice by means of bladders: the dry earth treatment, and immersion of the extremity under water and retaining it there, have both had their distinguished adherents, but all these auxiliaries "pale their ineffectual fires," before the properly selected homœopathic remedy. After suppuration has fairly begun, the surgeon should be watchful of the accumulation of pus, and guard against the fistulous sinuses and abscesses that threaten the deeper seated portions contiguous to and dependent upon the wound.

If much tumefaction occur, or abscesses threaten, free incisions should be made for the purpose of drainage; and if the communication between the point of entrance and that of exit be tolerably direct, much benefit will be derived by injecting the sinus with warm water and following this with a solution of *Calendula* or *Hypericum*. If offensive odors are emitted from the wound, a few drops of Carbolic acid, Salicylic acid, Permanganate of potash or chlorinated Soda, may be added to the lotion for purposes of disinfection. The efficacious properties attributed to Carbolic acid, beside its antiseptic powers, of preventing the occurrence of erysipelas and hospital gangrene, so common in wards where many suppurating and sloughing wounds are grouped together, make it a remedy

of great value. Cleanliness and ventilation are hygienic requisites that should be always insisted upon by the surgeon, in the treatment of such cases; especially in tropical climates and during heat of summer. During such times, flies propagate with wonderful rapidity, and depositing their ova in the opening of wounds, generate larvæ in great numbers. Dr. Proctor, of Kentucky, describes these insects as one of the greatest evils that the surgeons had to contend against during the war with Mexico. The same trouble was frequently experienced in the war of the Rebellion. Wounds carefully cleaned and dressed in the morning, were found infested with these parasites the following morning.

I have seen them present in wounds in great numbers, and in size equal to a crow-quill and from five to nine lines in length. The wounded view their appearance with no little alarm and horror. I have seen the stoutest hearted soldier sickened at the sight of these disgusting insects, and appear hopelessly willing to yield his life without farther struggle.

Sometimes they burrow deep into the tissues, producing great pain and distress. The best preventive of these parasites is continued and unceasing cleanliness with frequent renewal of the dressings. Afterward bury the affected part in dry bran. In such cases, I have seen the best effects follow the employment of a solution of Carbolic acid and Glycerine, or Carbolic acid alone, the maggot quickly disappearing after its application. The strength of the solution employed by me, is one drachm of the acid to one quart of water, which will not only destroy the larvæ, but will prevent the flies from depositing their ova upon the surfaces moistened with it.

Dr. Bumford, of Texas, gives particulars in the case of a patient who perished from the effects of the deposition of these insects in the nasal cavities, whence they ascended to the frontal sinuses, from which it was impossible to dislodge them by the best directed means. Dr. Comstock, of St. Louis, has derived great benefit, in such cases, from an ointment of Elderbark, applied to the suppurating surfaces.

The custom of enlarging the orifices of gunshot-wounds, so much practised among continental surgeons, and so tenaciously

adhered to by the French, has been of late years almost entirely abandoned. A modification of this practice was introduced into the Confederate service during the war of the Rebellion, by Dr. Chishold, of South Carolina. He pared the edges of the wound in such a way as to convert the opening into a subcutaneous wound, but the practice was not attended with the hoped-for success. This process was subsequently practised by the British surgeons in New Zealand in the recent Maori war, but there it also proved a failure.

*Local Treatment.*—After having extracted all foreign bodies that may be found in the soft structures, and bathed the parts well with warm water until they are perfectly cleansed from all impurities, a solution of *Hypericum perf.* (one ounce to one quart of water) should be applied to the wounded part by means of pledgets of lint or charpie laid upon the surface. In the course of the first twenty-four hours, the injured part becomes stiff, slightly swelled, tender and a slight inflammatory blush surrounds the open wounds. This continues for a day or two, and is succeeded by suppurative action when, under favorable circumstances the wound heals kindly, after a week or ten days, by granulation or cicatrization. If the case does not progress rapidly enough under the use of the above remedy, and the suppuration increases and becomes more diffused, recourse should be had to the use of *Calendula officin.* of the same strength as the foregoing, and kept constantly applied to the suppurating surfaces. Granulation will now soon take place, the length of time depending upon the strength of the patient's constitution, the exit opening being, as a rule, the first orifice to close. At the period of loosening and separation of the sloughs, there is always especial danger of the supervention of consecutive or secondary hæmorrhage.

At this time the patient requires to be carefully watched, and, if the wound be in proximity to a great vessel, a tourniquet should be thrown around the limb loosely, so as to be tightened at a moment's notice. If hæmorrhage occurs under these circumstances, the artery should be ligated in the wound if possible; if not, then in the most convenient situation above it. If this does not arrest it, and all means fail in preventing



hemorrhage, amputation is the next sad resource, but should never be done until all justifiable means have been resorted to in vain.

When the wound is complicated with unfavorable circumstances, whether inducing in the patient a condition of asthenia or its reverse, the cure may be protracted for weeks and months under the most skillful and careful management. If erysipelas should attack the wounded parts, the remedies applicable to that disease should be employed, just as if there were no other complications. For all contused conditions of the surface, unattended with division of the dermic structure, Arnica is, par excellence, the best remedy both externally and internally, if there are no systemic symptoms contraindicating its use.

*Arnica*.—The effects of this remedy are most marked and beneficial in those cases of gunshot-wounds when there is tendency to great depression, even to extinction of the vital powers. It is especially indicated in the contusions that follow gunshot-injuries; acting powerfully upon the vegetative sphere it stimulates the weakened and depressed absorbents into increased activity, especially when their function is impaired or even suspended by external injury. By virtue of this action, it becomes an important agent of cure in all congestions and low grades of inflammation that are the result of blows, kicks, contusions and sanguineous extravasations that follow injuries of whatever nature.

*Calendula officinalis*.—This is one of the most valuable remedies now known for the treatment of suppurating surfaces, ulcerations, etc., following gunshot-wounds. It exercises a profoundly curative impression upon the diseased tissues, prevents disintegration and ulceration to a great degree, and assists in expediting the process of granulation and cicatrization. I have employed it, with the most satisfactory results, in a large number of amputations, resections, and ulcerated surfaces, in hospitals and private practice, and in a great many instances perfect union of the divided edges was effected with the least possible suppuration. In some of the most frightfully lacerated wounds, followed by suppurative action, I have

seen its prompt and beneficial effect ; suppuration gradually diminishes and granulation takes place quickly ; strikingly in contrast with the increasing suppuration and slow and tedious process of cure under allopathic medication. I consider it the best and most reliable *vulnerarium* now in use. It may be administered internally as well as locally, and may be continued under appropriate circumstances until complete and firm cicatrization has taken place.

*Hypericum perf.*—This is another valuable remedy in the treatment of wounds, and it is particularly called for when the parts have been extensively lacerated and torn, with engorgement of the capillaries, attended with more or less discharge of bloody serum. It stands in the same relation to laceration of the tissues, that Arnica holds to their contused condition. As a local application in lacerated wounds, before suppuration has set in, it stands preëminently among the most valuable remedies of the *Materia Medica*. It acts directly in removing the ill-effects of local shock, prevents, in a great measure, sympathetic irritation of the system from the local derangement, and modifies, in a corresponding degree, the subsequent inflammation and sloughing. In recent cases and after spasmodic irritation of the capillary system has passed away, a solution of this remedy, composed of one ounce of tincture to ten of water, applied constantly to the injured part has effected the most brilliant results in very severe lacerated wounds. The remedy in the slighter forms of laceration, if applied early, will often entirely arrest and always modify the supervention of ulceration and sloughing. By its use, I have succeeded in preserving the vitality of torn and lacerated tissues, when almost entirely separated from the body, and, in compound fractures of the feet and hands, with extensive laceration of the soft parts, the *Hypericum* has produced the most brilliant results. In a case of compound dislocation of two fingers, with severe laceration and tearing of the external structure, the members being severed except by a narrow bridge of skin uniting them to the body, I succeeded, by the use of this remedy, in completely saving the severed digits; the bones uniting on being replaced and maintained in apposition. I

believe that this remedy is destined to become one of our most valued curative remedies in all cases of gunshot-wounds, and if I were compelled to select three remedies for the local dressings of this class of injuries on which solely to rely, I should select the three mentioned above; and by their use I should be certain of producing better and more satisfactory results than with the whole combined armamentarium of the Allopathic School. This I affirm, after a long and continued use of the remedies, and with a full conviction of their curative powers.

*Momordica bals.*—This remedial agent has been highly extolled by Drs. Hill and Hunt as a valued remedy for lacerated wounds, but whether this recommendation is based on practical observation or theoretical induction, I am not able to say. I have had little experience in the use of the remedy and cannot, therefore, speak *ex cathedra* of its sphere of action in the variety of wounds under consideration.

*Constitutional Treatment.*—The constitutional treatment of a patient with an ordinary gunshot-wound uncomplicated with any injury to bone or structures of first importance, is simple, and in accordance with the systemic derangements and irritations as they crop out during the existence of the wound. The surgeon should place his patient under the most favorable circumstances and surroundings; and the temperature of the apartment should be kept as nearly as possible at a uniform standard. Regard should be paid to ventilation; cleanliness should be observed, and attention given to his diet, and to the regular discharge of excrementitious substances as well as the avoidance of all irregular habits tending to excite febrile disturbance or aggravate local inflammation. The diet should be plain and nutritious, but not stimulating. If a tendency to stiffness exists in the limb, or contractions of the extremities be observed, they should be carefully and gradually overcome by passive motion employed from day to day at regular hours; also, frictions with the hand or rubbings with stimulating applications, will be found of service. A favorite remedy among French surgeons, in wounds threatening an unhealthy appearance, is a lotion composed of thirty drops of the Perchlôride



of iron to six times the amount of water. Combined with the local measures mentioned above, due attention must be given to all constitutional symptoms as they occur.

*Aconite*.—If the subsequent fever be frank and high, with full, bounding pulse, dry and hot skin, with restlessness and thirst, *Aconite* takes the place of both local and general bleeding, without the deleterious consequences of either, curing the inflammation “without going out of our way to produce debility, and thus favor the occurrence of toxicæmia.”

It is generally the first remedy indicated in true inflammatory excitement, whether the inflammation is located in the coverings of the brain, the mucous or serous tissues, the muscular or glandular system, or the nobler organs in the three great cavities of the body. Its use is to restore the capillary equilibrium, and calm the nervous excitability, thereby producing resolution of the inflammatory process. Its action is primarily upon the cerebellum and the terminal ramifications of the cranial, spinal and sympathetic nerves, interwoven in the capillary tissue. It unloads the contracted, torpid or semi-paralyzed capillaries, which give rise to acute congestion or inflammation, and directs the blood onward in its course, thus giving freedom to the general circulation. “I have repeatedly felt justified,” says Diez, “in declaring that *Aconite* is a universal anti-phlogistic, and corresponds to the first stage of inflammation.” As a remedy for such, it holds the foremost rank of all medicinal agents which have been proved up to the present.

It not only supplies the place of all the anti-phlogistic remedies of the Allopathic School, but it is far superior to them all, as well in certainty of result, as in harmlessness in action.

*Belladonna*, *Apis* or *Cantharis* may be employed against the invasion of erysipelas, which will be indicated by chills, flashes of fever, headache, quick pulse and a simultaneous drying up of the secretions, the margins of the wound becoming slightly swollen and of a reddish tinge.

*Merc. sol.* should be given whenever there is danger of the formation of an abscess; and *Hepar sulph.* or *Silic.*, whenever

the abscess has been formed, to facilitate its pointing, which should be opened as soon as fluctuation is felt. If the surrounding integument assumes a dark red or bluish appearance, with an œdematous condition of the adjacent tissues, Arsen. or Lachesis will be demanded. Baryta and Conium will be found useful whenever induration takes place around the borders or within the deep tissues of the abscess. As soon as suppuration becomes fairly established, the diet should be generous. Sherry and other wines may be given, if used judiciously, and the patient's strength be sustained by the best directed efforts of the surgeon. If chills and fever supervene, with great restlessness, prostration, burning pains, sweats, etc., Arsenicum should be given and continued until amelioration takes place, when some other remedy may be substituted. Arsenic. and Lachesis are invariably indicated upon the supervention of gangrene. Ruta is useful in injuries of the periosteum, tarsal or carpal joints. Asafoetida, Mezereum, and especially Symphytum, are useful in those cases where the bones are affected.

Belladonna, Rhus tox. or Bryonia will assist materially when typhoid symptoms are present; also in delirium and in sub-acute inflammation of the brain and its membranes. In fact, whatever complications arise during the treatment of these wounds, they must be overcome by the indicated remedy, the same as if the derangement or disease was of first consideration.

*Gelseminum*.—This is a remedy of great curative power in inflammatory affections of a sthenic type, complicated with biliary derangements. In simple irritative fever following gunshot-wounds it is more competent to relieve the accompanying phenomena than Aconite: and, in such cases, challenges the attention of the surgeon. It corresponds with excessive nervous irritation, tendency to irregular convulsive action, periods of wakefulness, with nervous prostration and accessions of feverish stupor. In the endemic diseases of the Mississippi Valley, and in irritative fevers following wounds and injuries of various kinds, it acts promptly and efficaciously, quieting nervous irritation and excitement, equalizing the circulation, promoting perspiration and rectifying the various secretions, without causing nausea, vomiting or purging.

*Veratrum vir.*—This remedy exercises a powerful impression on the nervous centres and, through them, upon the great centre of circulation, resembling in its action the impression made by Aconite. Dr. Cauniff says that "it is a powerful anti-phlogistic, that it acts upon the heart promptly and powerfully, producing coolness of the skin with moisture, in a very short time." In pneumonia and pleurisy following gunshot-wounds, I have found it an excellent remedy, arresting the inflammatory action quickly, and saving the lungs from the more severe consequences of the second stage or that of red hepatization. In diseases of the brain assuming a congestive type, and in all plethoric conditions when there is a tendency to organic lesion of the organ attacked, it is one of the most reliable and efficient remedies of our School.

*Arsenicum.*—This remedy is indicated more frequently in the secondary affections following gunshot-wounds, or in those adynamic conditions that are sometimes the result of surgical operations. It corresponds more closely to those adynamic characteristics of the system in which the vital organs are more deeply affected by the morbid process, and when there exists a manifest tendency to the formation of sores and petechiæ, with evident tendency to decomposition. In asthenic inflammations of a malignant type, tending to disorganization with vital prostration, and a predisposition to terminate in erysipelatous, gangrenous or cancerous affections, this is a potent and reliable remedy, and in these diseases following gunshot-wounds, I have derived from it the greatest amount of benefit.

*Belladonna* is especially demanded in persons of a plethoric nature, with tendency to congestions of blood to the head, lungs, or abdomen. It seems to act primarily upon the cerebro-spinal system of nerves, and secondarily upon the vascular system. In typhoid fevers following surgical operations, gunshot-wounds or injuries of whatever kind, where congestive symptoms predominate, it is a remedy in especial favor. In erysipelatous inflammation consequent upon gunshot-wounds, especially when it is disposed to invade the inner tissues, or where it attacks the face and spreads to the head inducing inflammation of the cerebrum and its envelopes, it is a prominent remedy.



The great Liston, in relating the treatment of a case of erysipelas, says: "We subdued the fever with Aconite, and then administered the Extract of Belladonna, and in twenty-four hours the disease had quite disappeared." And he adds: "How this effect is produced we cannot say, but it seems to act like magic, and as long as we benefit our patients we have no right to condemn the principles upon which this treatment is recommended and pursued."

*Baptisia tinct.* is indicated in those gunshot-wounds where secondary complications ensue, or where there is an adynamic type or condition as in typhoid and those low grades of fever that follow wounds. "Applied in the form of a lotion," says Hale, "to ulcers, mucous surfaces, etc., where there is a tendency to putrescence of the fluids and solids, gangrene, fetid discharges, it is said to correct the conditions in a very prompt manner." In affections of the glandular system, scrofulous and mercurial ulcers, erysipelatous degenerations, that may occur in the train of treatment of gunshot-wounds, it is a valuable addition to the *Materia Medica*.

*Bryonia alba* is a remedy of remarkable efficiency in many of the diseases incident to gunshot-wounds, especially in those conditions that occupy an intermediate position between inflammation and nervous irritation. It is especially curative in hyperæmia of serous and mucous membranes; in affections where resorption is required, such as typhoid infiltrations, serous effusions and sanguineous exudations. In those tearing and lacerating pains greatly increased by motion and aggravated at night it is particularly indicated.

*Chininum sulph.* is often of value in periodic diseases following gunshot-injuries, or the surgical operations required in their treatment, miasmatic diseases, cerebral congestions which assume a paroxysmal tendency, disturbances of the special senses, and depression of the vascular system, constitute important indications for its use.

*Hepar sulph.* is more specially indicated in the secondary conditions that crop out in the treatment of gunshot-injuries. It is of primary importance in all those conditions wherein suppuration threatens or the formation of abscesses are apprehended.

*Calcarea carb.* is valuable in all those affections belonging to a scrofulous degeneration, such as scrofulous ulcers following gunshot-wounds, wherein the powers of life are depressed in consequence of the constitutional effect of the injury, in psoas abscess, ulcerations of the joints, and during the reunion of bones, in fractures and injuries when the conservative process is relied upon in the treatment of the case.

*Silicea* is preferable to the former remedy in affections of the bones, and where there exists a tendency to glandular swellings in consequence of a scrofulous diathesis. It possesses an extraordinary control over suppurative processes, hastens the maturing of abscesses when desired, and certainly reduces suppuration to moderate limits.

*Symphytum*.—In all diseases of bone following gunshot-wounds, especially after the acute stage has passed away, where there exists an impairment of nerve-power, or debility from any cause, keeping up a retardation of the reparative process, there is no remedy of which I have any knowledge, that compares with *Symphytum*. It has accomplished in my hands the most beneficial results in assisting the reparative process, causing proliferation of cells and the rapid formation of the constructive process.

These are a few of the more important remedies applicable to the treatment of gunshot-wounds; others may be called into requisition, depending, of course, upon the various diseased conditions that may arise during the treatment of the case, each of which must be combatted and controlled by the appropriate simillimum.

*Surgical Interference*.—On this occasion I shall not enter into the comparative advantages of primary as compared with secondary amputations in gunshot-wounds. I would refer the reader to quite a lengthened review of this subject in my treatise on the "Science and Art of Surgery," vol. i., p. 719, entitled "Primary and Secondary Amputations considered."

For a long time the opinion has been held that primary amputations should not be performed until the first inflammation has passed away, but the experience of late years has proved this position to be untenable.



The great success of primary amputations seems to depend upon the following conditions: 1. That a mangled and contused limb is a constant source of accumulative irritation, and the sooner it is dispensed with the better for the patient; 2. The excitement of battle lends courage to the sufferer in the primary operation, and makes him the better able to bear the early amputation, while the influences that associate themselves with hospital life, are depressing and injurious; 3. The operation removes a continual source of dread and suffering, that must produce its moral effect upon the patient so long as it is impending; 4. Anæsthesia acts more promptly and beneficently in the earlier than in the later period of gunshot-wounds.

Recent and extensive observations in foreign wars as well as during the war of the Rebellion, have established the fact that primary amputations, as a rule, promise better results than the secondary. Dr. Scriver, in recording the experience of the French army in the Crimea, shows that primary exceeded by two-thirds secondary amputations. During my connection with the United States service in the war of the Rebellion, especially in the latter part of it, I acted on the principle, that the sooner, after injury, amputation is performed, the better, *ceteris paribus*, is the chance for recovery. Whenever I could get ready access to the severely wounded requiring surgical interference, even amid the din of battle, my judgment led me to believe that immediate operation gave the greatest hope of success. I therefore operated at once, using the period of shock, or Nature's anæsthesia, as the most opportune time for surgical relief, without waiting for the period of reaction upon which so much stress is laid by many writers. The best results, as a rule, followed where the operations were performed before the commencement of reaction from the shock of injury. I have operated scores of times during my army service, after waiting for arterial reaction and the administration of anæsthetics; but I always observed in such cases that the recovery was slower and less certain, than the like operation performed during the period of Nature's shock (*vide* the author's "Science and Art of Surgery, vol. i., p. 720, *et seq.*).



During active operations in the field, when it becomes necessary to transport the wounded some distance, it is absolutely imperative that the surgeon should make all necessary amputations *immediately* as the surest means of preserving the lives of his patients.

*The consequences* of gunshot-injuries depend in a great degree upon the severity and extent of the wound, the nature and importance of the structures affected, the judicious management of the case in the first stage and the constitutional vigor of the patient. Among the most prominent of the diseases consequent upon this class of injuries may be specified: erysipelas, inflammation of particular structures, mortification, gangrene, pyæmia, fistula, paralysis, tetanus, pneumonia, phagedæna, hernia, etc., etc.